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10/559,743	12/07/2005	Yoshiyuki Suetsugu	28955.1062	5935

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EXAMINER	
EWALD, MARIA VERONICA	
ART UNIT	PAPER NUMBER
1791	
MAIL DATE	DELIVERY MODE
05/01/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/559,743	SUETSUGU ET AL.	
	Examiner	Art Unit	
	MARIA VERONICA D. EWALD	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 February 2008 and 08 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 4-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/8/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4, 7 – 8, 12 – 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. (U.S. 5,284,625) in view of Archer, et al. (U.S. 6,656,541). Isayev, et al. teach an apparatus of applying ultrasonic vibration to a resin material, which applies the ultrasonic vibration to the resin material in a molten state, the apparatus comprising: a vibrator which applies ultrasonic vibration to a resin material, or a vibration transmission member which transmits the vibration of the vibrator to the resin material (item 15 – figure 1), wherein the vibrator or the vibration transmission member is located in a channel of a flowing molten in contact with the resin material (figures 1 – 8) and the vibrator or the vibration transmission member is positioned to transmit vibration in a direction perpendicular to a flow direction of the flowing molten resin material (figures 4 – 6); and vibration transmission inhibition means is positioned to substantially inhibit members other than the resin material from being vibrated by the vibration of the vibrator or the vibration transmission member (item 52 – figure 14; column 9, lines 15 – 22); wherein the vibration transmission inhibition means is an elastic member interposed between the vibrating member or the vibration

transmission member and the other member (item 52 – figure 14; column 9, lines 15 – 22); wherein the vibration transmission inhibition means is a gap interposed between the vibrating member or the vibration transmission member and the other member (figures 1 and 14); wherein a size of the gap is set to 0.05 mm or more and 0.5 mm or less (column 9, lines 40 – 43).

With respect to claims 12 – 16 and 18, Isayev, et al. further teach that the vibrator or the vibration transmission member is a horn having any shape of a columnar shape, plate shape, ring shape, circular cone shape, truncated cone shape, conical shape, exponential shape, rectangular parallelepiped shape, cube shape, and a shape in which a slit cut or flange is formed on any of these shapes (figure 1); wherein the plurality of horns of arranged in series or in parallel along the channel (figures 4 – 8; column 7, lines 55 – 69); wherein the plurality of horns are arranged around the channel and the vibration is applied to the resin material from different directions (figures 4 – 8); wherein the channel is formed in one of a cylinder of an extrusion machine or an injection molding machine, a cylinder of an extruder or a kneader, a chamber a downstream side from an outlet of the cylinder and a mold (figure 1; column 6, lines 60 – 68); wherein the resin material is one of a mixture of two or more resins and/or elastomers, and a mixture of a resin and/or an elastomer and a filler (column 3, lines 5 – 25); wherein a resin composition is produced using the apparatus (column 3, lines 5 – 25).

With respect to claim 17, Isayev, et al. teach a method of kneading, compounding and blending a resin material comprising the steps of: disposing the

ultrasonic vibration applying apparatus in a channel through which the resin material having a molten state flows (figure 1; column 7, lines 5 – 15); and applying the ultrasonic vibration to the resin material which flows through the channel from a direction crossing a flow direction of the resin material at right angles (figures 4 – 8); the application of the ultrasonic vibration through the vibrator or the vibration transmission member being performed under conditions that members other than the vibrator or vibration transmission member are not substantially vibrated (figure 14).

Isayev, et al., however, do not specifically teach that vibrator or the vibration transmission member has high adhesive properties to the resin material. Fabricating a vibration transmission member such as the sonotrode tip or the horn with high adhesive properties to the resin; however, is known. Typical sonotrodes or horns are fabricated of a sturdy metal of which such metals exhibit a high adhesion to a resin material.

For example, Archer, et al. teach an ultrasonic tip used to repair cracks in windshields. The ultrasonic tip is made of a sturdy metal such as titanium which produces the desired physical characteristics in the flowable resin material (column 1, lines 43 – 47). Thus, the ultrasonic applicator tip has high adhesive properties to the resin material, such that it produces the characteristics desired in the resin.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the sonotrode or horn of Isayev, et al. of titanium for the purpose of producing the desired the physical characteristics in the flowable resin material, since titanium is a sturdy metal and known to exhibit an affinity for the resin material as taught by Archer, et al.

Claims 1 and 4 – 5, 7, 12, 15 – 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Allan, et al. (U.S. 2006/0165832 A1) in view of Archer, et al. Allan, et al. teach an apparatus of applying ultrasonic vibration to a resin material, which applies the ultrasonic vibration to the resin material in a molten state, the apparatus comprising: a vibrator which applies ultrasonic vibration to a resin material, or a vibration transmission member which transmits vibration of the vibrator to a resin material (item 34 – figure 1), wherein the vibrator or the vibration transmission member is located in a channel of a flowing molten resin material in contact with the resin material (figure 1; paragraph 0010); and the vibrator or the vibration transmission member is positioned to transmit vibration in a direction perpendicular to a flow direction of the flowing molten resin material (figures 1 – 3, 5 and 7); and vibration transmission inhibition means is positioned to substantially inhibit members other than the resin material from being vibrated by the vibration of the vibrator or the vibration transmission member (item 40 – figure 1; paragraph 0039); wherein the vibration transmission inhibition means is an elastic member interposed between the vibrating member or the vibration transmission member and the other member (item 40 – figure 1; paragraph 0039); wherein a connecting portion which connects the vibrating member or the vibration transmission member to the other member is progressively formed in a position corresponding to a node portion of the vibration transmitted inside the vibrating member or the vibration transmission member, and the elastic member is interposed between the connecting portion and the other member (figures 1 and 2).

With respect to claims 7, 12 and 15 – 16 and 18, Allan, et al. also teach that the vibration transmission inhibition means is a gap interposed between the vibrating member or the vibration transmission member and the other member (figure 1); wherein the vibrator or the vibration transmission member is a horn having any shape of a columnar shape, plate shape, ring shape, circular cone shape, truncated cone shape, conical shape, exponential shape, rectangular parallelepiped shape, cube shape, and a shape in which a slit cut or flange is formed on any of these shapes (figure 1); wherein the channel is formed in one of a cylinder of an extrusion machine or an injection molding machine, a cylinder of an extruder or a kneader, a chamber a downstream side from an outlet of the cylinder and a mold (figures 1 – 5; paragraphs 0001 and 0015); wherein the resin material is one of a mixture of two or more resins and/or elastomers, and a mixture of a resin and/or an elastomer and a filler (paragraphs 0001 - 0003); wherein a resin composition is produced using the apparatus (paragraphs 0001 - 0003).

With respect to claim 17, Allan, et al. teach a method of kneading, compounding and blending a resin material comprising the steps of: disposing the ultrasonic vibration applying apparatus in a channel through which the resin material having a molten state flows (figure 1; paragraph 0001); and applying the ultrasonic vibration to the resin material which flows through the channel from a direction crossing a flow direction of the resin material at right angles (figures 1 – 5); the application of the ultrasonic vibration through the vibrator or the vibration transmission member being performed under conditions that members other than the vibrator or vibration transmission member are not substantially vibrated (paragraph 0039).

Allan, et al., however, do not specifically teach that vibrator or the vibration transmission member has high adhesive properties to the resin material. Fabricating a vibration transmission member such as the sonotrode tip or the horn with high adhesive properties to the resin; however, is known. Typical sonotrodes or horns are fabricated of a sturdy metal of which such metals exhibit a high adhesion to a resin material. Furthermore, it is already noted that the sonotrode of Allan, et al. is already fabricated of metal, such that a non-metallic sealing ring is disposed between the sonotrode and the die block to prevent resin leakage and metal-to-metal contact (paragraph 0072).

Archer, et al. teach an ultrasonic tip used to repair cracks in windshields. The ultrasonic tip is made of a sturdy metal such as titanium which produces the desired physical characteristics in the flowable resin material (column 1, lines 43 – 47). Thus, the ultrasonic applicator tip has high adhesive properties to the resin material, such that it produces the characteristics desired in the resin.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the sonotrode or horn of Allan, et al. of titanium for the purpose of producing the desired the physical characteristics in the flowable resin material, since titanium is a sturdy metal and known to exhibit an affinity for the resin material as taught by Archer, et al.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. or Allan, et al. in view of Archer, et al. Isayev, et al., Allan, et al. and Archer, et al. teach the characteristics previously described but do not specifically teach that the

elasticity of the vibrating member relative (Eh) to the elastic member (E) is such that 0.3Eh > E.

However, this is obvious and is within the level of one of ordinary skill in the art. The elastic member used by both Isayev, et al. and Allan, et al. is a Teflon gasket, while the ultrasonic horn is metal. The modulus of elasticity is defined as the stiffness of the material or the degree to which it deforms. Teflon will deform more readily and thus, its modulus of elasticity (or measure of stiffness) is lower than the metal horn, which is more rigid and thus, its modulus of elasticity is higher. Furthermore, depending on the metal chosen, it is obvious that at some point 0.3Eh>E.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to ensure that Eh of the vibrating member is related to E of the elastic member such that 0.3Eh>E for the purpose of ensuring that the elastic member deforms more readily, able to absorb the vibrations transmitted to it without transmitting such vibrations to the other member, which in turn ensures that only the resin is vibrated.

Claims 9 – 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. or Allan, et al. in view of Archer, et al. and further in view of Rice (U.S. 5,269,860). Isayev, et al., Allan, et al. and Archer, et al. teach the characteristics previously described but do not teach that the vibration-applied surface, on which the vibrating member or the vibration transmission member contacts the resin material is a

processed and/or treated surface to improve the adhesive properties of the vibrator or the vibration transmission member to the resin material.

In a method to ultrasonically bond thermoplastic to fibers, Rice teaches the use of an ultrasonic horn to weld thermoplastic sheets to a fibrous textile surface. The ultrasonic horn used has a tip surface, which is shaped to follow the contour of the sheet being bonded (column 4, lines 20 – 30). The contour may be curved, round, solid or tubular (column 4, lines 20 – 30). Furthermore, Rice teaches that the use of maleic anhydride-based polymers (amorphous crystals) effectively transmit the ultrasonic energy due to their random molecular arrangement and thus, are appropriate to use when bonded to a non-thermoplastic fiber (column 2, lines 60 – 69; column 3, lines 1 – 10, 20 – 26). This suggests that the surface of the vibration transmission member or vibrator be subjected to surface treatment wherein the treatment is the formation of grooves or a concave/convex surface and wherein the adhesive improver is maleic anhydride.

Thus, it would have been obvious to one of ordinary skill in the art to modify the surface of the ultrasonic horn of Isayev, et al. or Allan, et al. such that it is subjected to surface treatment or an adhesive improver such as maleic anhydride for the purpose of readily and effectively transmitting the ultrasonic energy to the resin.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. or Allan, et al. in view of Archer, et al. Isayev, et al., Allan, et al. and Archer, et al. teach the characteristics previously described but do not teach that the resin

composition is produced by mixing two or more thermoplastic resins and/or elastomers, wherein an interface is formed between the mixed thermoplastic resins, and one thermoplastic resin oozes like a feather into the other thermoplastic resin in the interface.

It is however, obvious that the apparatus is capable of producing such a composition, depending on the configuration of the extruder or injection molding apparatus. Furthermore, Allan, et al. state that ultrasonic vibration is known to improve the flow and distribution of the molding or resin material (paragraph 0002).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the apparatus of Isayev, et al., or Allan, et al. such that a resin composition is produced wherein one resin oozes into the other like a feather at the interface depending on the final product desired and chosen by the manufacturer.

Response to Arguments

14. Applicant's arguments filed February 4, 2008 have been fully considered but they are not persuasive with respect to some arguments, yet persuasive regarding the reference of Jameson, et al. and with respect to the limitation wherein the vibration or vibration transmission members of the primary references do not exhibit high adhesive properties to the resin material.

With respect to the reference of Jameson, et al., Applicant argued that the ultrasonic vibration is not perpendicular to the path of the resin flow. The Examiner agrees and thus, has withdrawn the rejection.

With respect to the reference of Isayev, et al., Applicant argued that the ultrasonic horn of Isayev, et al. lies parallel or within the path of the resin material, instead of lying perpendicular to the resin flow. The Examiner disagrees. As shown in figures 4 – 6, Isayev, et al. teach alternative embodiments wherein the ultrasonic horns may lie perpendicular to the main resin flow channel and yet contacts the resin extruded through the dies. However, with respect to the lack of the teaching in Isayev, et al. of any high adhesive properties to the resin, the Examiner agrees. Thus, in light of newly-amended claim 1, the Examiner cites the secondary reference of Archer, et al. Archer, et al. teach an ultrasonic applicator made of titanium. Titanium is identified in Applicant's specification, among other typical metals as commonly-used materials for ultrasonic horns to have an affinity for resin material or is a material exhibiting high adhesive properties to the resin (see specification, page 18, lines 20 – 30). Titanium is a known metal for the fabrication of ultrasonic horns or sonotrodes. Archer, et al. is cited as teaching the use of a titanium ultrasonic tip and furthermore, Archer, et al. state that titanium is used because it imparts the desired physical characteristics in the flowable resin.

With respect to the reference of Allan, et al., Applicant argued that the reference fails to teach a sonotrode with high adhesive properties to the resin. The Examiner agrees that there is no specific teaching; however, Allan, et al. do teach that the

sonotrode is made of metal. Again, the reference of Archer, et al. is cited as teaching the use of titanium horns or sonotrodes as exhibiting an affinity for the resin material.

With respect to the remaining claims and the secondary references, the Examiner has maintained the rejections.

References of Interest

15. Furusawa, et al. (U.S. 5,202,066), Probst (U.S. 5,435,712), Nakamura (U.S. 6,190,601), Grunitz (U.S. 6,203,747), and Isayev, et al. (U.S. 2003/0124211 A1) are cited of interest to show the state of the art. Each of the above references teach the use of ultrasonic horns or apparatus in communication with a resin material transported through an extruder. Furthermore, it is noted that Isayev, et al. teach an ultrasonic horn which is located in the resin channel, such that it transmits ultrasonic vibration perpendicular to a flow direction of the resin material.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA VERONICA D. EWALD whose telephone number is (571)272-8519. The examiner can normally be reached on M-F, 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Yogendra N Gupta/
Supervisory Patent Examiner, Art Unit 1791

MVE